

CAREOSPINA QUERCIVORA, A NEW GENUS AND SPECIES OF MOTH INFESTING LIVE OAKS IN CALIFORNIA¹

(LEPIDOPTERA: INCURVARIIDAE)

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ABSTRACT—*Careospina*, new genus, is proposed for *C. quercivora*, new species, described from the coastal ranges of California. The larvae are known to infest at least two species of live oaks, feeding at first as leaf miners and then later as leaf skeletonizers after constructing portable, larval cases. The cases are lenticular in shape and are formed from oval sections cut from the leaves of the host. The species is believed to undergo one generation per year with the adults emerging from late spring to mid-summer.

The moths discussed in this article were first collected and reared over thirty years ago by Dr. R. M. Bohart of the University of California, Los Angeles. Bohart sent his material to Dr. Annette Braun who recognized the insect as an undescribed species of *Incurvariidae* near the genus *Lampronia*. Since then Dr. L. R. Brown and C. O. Eads of the University of California at Riverside have studied the life history of this species. The results of their work were summarized in a well illustrated bulletin of that Institution on the insects affecting the oaks of southern California (1965). I am indebted to Dr. Brown for some of the study material incorporated into the present paper as well as for numerous photographs of immature stages.

Recently the biology of this and certain other oak-feeding Lepidoptera have been under intensive investigation by Dr. Paul Opler of the University of California at Berkeley. His request of a name for this moth for a publication soon to appear has prompted the present paper. I am grateful to Dr. Opler for most of the specimens examined of this species and also for information concerning its life history. I am currently revising the American species of *Incurvariinae* and will include a more lengthy review of the biology of this new species in that report. The reader should also be cautioned that the familial name, *Incurvariidae*, although commonly used over the years by a number of authors, does not have priority and may be synonymized in my forthcoming revision.

***Careospina*, n. gen.**

Type-species.—*Careospina quercivora*, n. sp.

Adult.—Small, slender bodied moths; wing expanse approximately 7–10 mm.

¹ Immediate publication secured by full payment of page charges—Editor.



Fig. 1. *Careospina quercivora*, n. sp., holotype, male, wing expanse 10 mm.

Head (figs. 3-4): Densely hairy, entirely rough. Antennae simple, 0.6-0.8 the length of forewing, 32-36 segmented; sensory setae short, 0.5 the diameter of flagellum; pecten present, consisting of approximately 6-10 scattered setae from venter of scape; antennal sockets well separated, the intersocketal distance usually more than 2.2 the diameter of socket. Ocelli absent. Compound eyes large, spherical; vertical diameter equal to interocular distance across frons. Mandibles present, greatly reduced. Galeae short, approximately equal to length of labial palpi. Maxillary palpi long, nearly 2.0 the length of labial palpi, usually folded in repose, five segmented; fourth segment the longest, nearly 3.0 the length of fifth. Labial palpi three segmented.

Thorax: Wings relatively narrow, greatest width approximately 0.25 the length, apices subacute; microtrichiae (aculeae) evenly scattered over both wings. Forewings 12-veined; all veins arising separate from discal cell except 7 and 8 which are stalked about 0.25-0.35 their lengths; accessory and intercalary cells faintly present. Prothoracic tibia without an epiphysis.

Male genitalia: Uncus simple, reduced in size. Vinculum-saccus broadly triangular. Valvae relatively slender; ventral margin with a single pecten present. Juxta broad. Aedeagus relatively short and stocky; cornuti present.

Female genitalia: Apex of ovipositor depressed, broad and stout, acuminate. Apophyses relatively stout. Ductus bursae shortened, seldom extending beyond cephalic ends of anterior apophyses when ovipositor extended. Signum absent.

Discussion.—With our present knowledge, this genus and species stand relatively remote from nearly all other incurvariine taxa. On the basis of certain morphological features and particularly with regard to general biology, *Careospina* demonstrates closest affinities to another monotypic, American genus, *Paraclemensia*. Similar to *Paraclemensia*, *Careospina* lacks an epiphysis and the apex of the female ovipositor is relatively broad and depressed. The two genera also

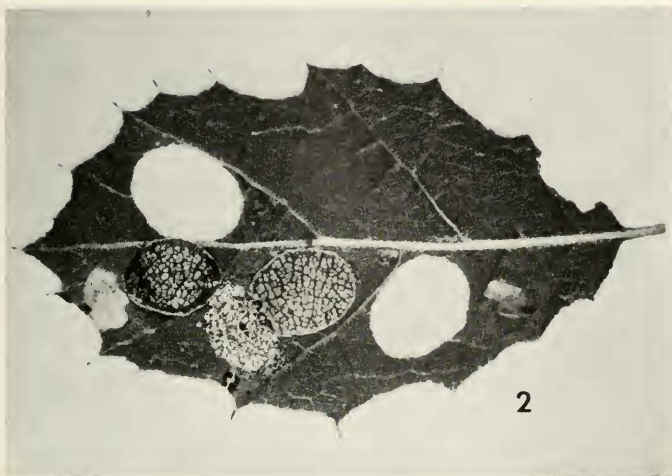


Fig. 2. Lower surface of leaf of coast live oak (*Quercus agrifolia*) showing injury and two larval cases of *Careospina quercivora*, n. sp. (after Brown and Eads).

share similar palpal segmentation. They differ most markedly in that *Paraclemensia* possesses broader wings (greatest width approximately 0.35 the length) and has lost vein 5 (M2) in the forewing. *Paraclemensia* also has eyes that are considerably smaller in size, and the juxta of the male is of a more complex, deeply furcated form, much different from the rather simple type present in *Careospina*.

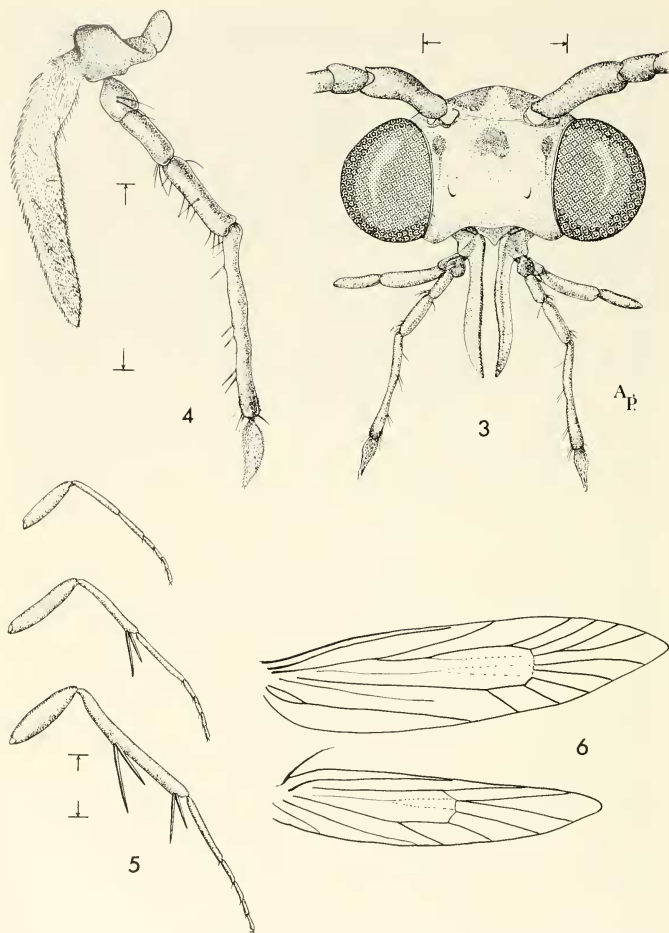
Biologically the two genera demonstrate a basic life history which is rather unique for the Holarctic Incurvariidae. The larvae of both *Paraclemensia* and *Careospina* commensate as leaf miners but soon begin to skeletonize the leaves of the host plant after first constructing portable cases. This type of behavior, although rare in genera of the northern hemisphere, seems to prevail more in the Australian species (Common, 1970) and is partially reminiscent to that of a closely related family, the Heliozelidae.

The generic name, *Careospina*, has been derived from latin (and treated as feminine) and refers to the fact that the epiphysis (spina) is absent (careo).

***Careospina quercivora*, n. sp.**

Adult (fig. 1).—Wing expanse: ♂, 7–9 mm; ♀, 7–10 mm.

Head: Pale stramineous. Antennae 0.65–0.75 the length of forewing; scape



Figs. 3-6. *Careospina quercivora*, n. sp.: 3, frontal view of head; 4, left maxilla; 5, legs; 6, wing venation. Scale = 0.5 mm.

and pedicel stramineous, flagellum fuscous, completely scaled. Maxillary and labial palpi stramineous; apex of second segment of labial palpi with a scattered brush of 4-6 long bristles.

Thorax: Dorsum fuscous, slightly iridescent. Venter paler, more brownish. Tarsal segments indistinctly ringed with light brown. Forewings uniformly fuscous with a slight bronzy luster except for a single, small whitish spot on hind margin near tornus (frequently obscure in rubbed specimens). Hindwings paler than forewings, grayish.

Abdomen: Fuscous above; paler, more grayish ventrally.

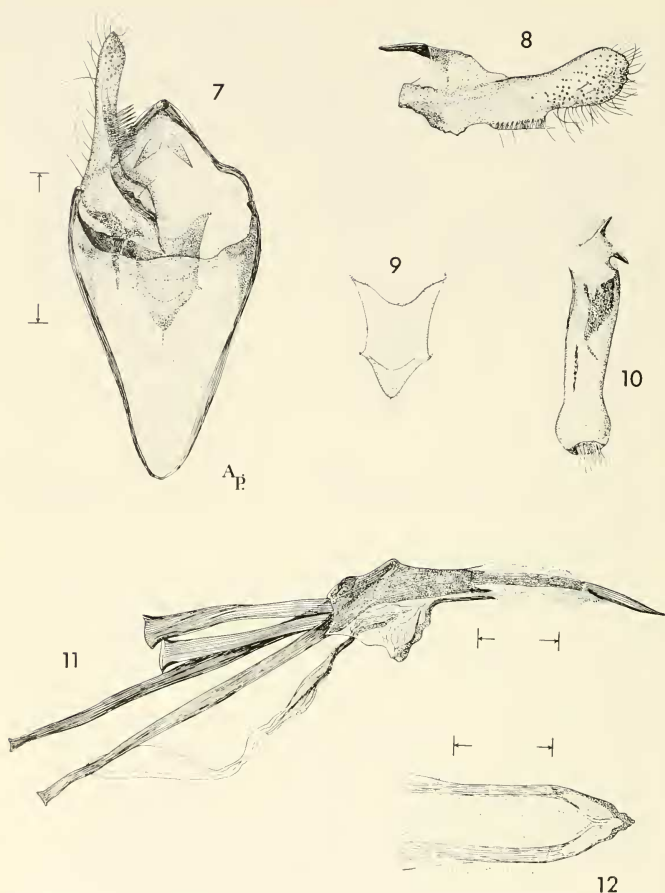
Male genitalia (figs. 7-10): Uncus reduced to a small, acute lobe. Vinculum and saccus triangular, relatively short, approximately equalling valvae in length. Valvae slender, sacculus slightly expanded; a single pecten consisting of 12-20 spines arranged in a single row midway along ventral margin. Juxta slightly longer than broad (length about 1.5 the width); base bluntly rounded, more narrow than caudal end. Aedeagus about as long as valvae, stocky, with two large cornuti present.

Female genitalia (figs. 11-12): Apex of ovipositor depressed, cutting edges serrate, bilaterally incised immediately below tip. Cephalic end of posterior apophyses flared. Ductus bursae slightly thickened, appearing somewhat rugose midway along length.

Holotype.—Tapia Park, Los Angeles County, California, ♂, coll. June 11, 1957, emerged July 7, 1957, by C. Eads and L. Brown, on *Quercus agrifolia*, USNM 72077; in the United States National Museum of Natural History.

Paratypes.—CALIFORNIA: Contra Costa Co.: Mt. Diablo, 2900 ft.: ♂, coll. Feb. 24, 1968 by P. Opler on *Quercus wislizenii*, emerged June 10, 1968 (UCB). Kern Co.: Keene: 5♂, 5♀, coll. Feb. 17, 1968 by P. Opler on *Quercus wislizenii*, emerged May 12-28, 1968 (UCB); 2♂, 2♀, coll. Feb. 17, 1968 by P. Opler on *Quercus wislizenii*, emerged May 7-30, 1968 (USNM); 6♂, 4♀, coll. March 28, 1968 by P. Opler on *Quercus wislizenii*, emerged July 6, 1968 (UCB); ♂, coll. May 31, 1968 by P. Opler, emerged May 30, 1968 (USNM); 2♀, coll. June 2, 1968 by P. Opler, emerged June 14-21, 1968 (UCB); ♀, coll. June 2, 1968 by P. Opler, emerged June 10, 1968 (USNM). Los Angeles Co.: Same data as holotype: 2♂ (USNM); ♂, ♀ (UCR). Westwood Hills: ♂, June 11, 1941, ♀, July, 1941, coll. by R. M. Bohart (AFB); ♀, July 1941 coll. by R. M. Bohart (USNM). San Bernardino Co.: 1 mi. W. Forest Home: 6♂, 5♀, coll. Mar. 29, 1968 by P. Opler on *Quercus wislizenii*, emerged June 12-July 17, 1968 (UCB); ♂, ♀, same date except emerged July 17, 1968 (USNM). Upper Lytte Cr.: 2♂, coll. April 25, 1943, emerged June 26 and July 5, 1943, ♀, coll. May 30, 1942, emerged July 13, 1942, on *Quercus wislizenii* (USNM). San Mateo Co.: San Mateo Memorial Park: ♀, coll. July 25, 1962 by C. A. Toschi (UCB). Described from a total of 29 males and 25 females.

Hosts.—FAGACEAE: "*Quercus agrifolia* Nee," (Brown and Eads, 1965); "*Quercus wislizenii* A.DC.," (from specimen labels). Opler (in



Figs. 7-12. *Careospina quercivora*, n. sp.: 7, male genitalia, ventral view; 8, right valve, lateral view; 9, juxta, ventral view; 10, aedeagus; 11, female genitalia, lateral view; 12, apex of ovipositor, dorsal view. Scale = 0.25 mm.

litt.) has indicated that most of his rearings of this moth were from the chapparal scrub form of *Quercus wislizenii*, variety *frutescens* Engelm.

Flight Period.—Early June to late July; univoltine. The flight period as given may be somewhat inaccurate as most, if not all, adult records are based on laboratory rearings. Misled by the slow and extremely variable development of the larvae, Brown and Eads (1956) concluded that there were two generations per year. However, the species appears to be only univoltine, with adults emerging from late spring to mid-summer.

Distribution.—Presently known from the coastal ranges of California, including Santa Cruz Island, from Riverside County north to Marin County and the San Francisco Bay area.

Life History.—Although oviposition probably occurs from late June throughout most of July, young larvae do not become noticeable until mid September and continue to appear on into winter as late as January as noted by Opler (in litt.). According to Brown and Eads (1965), the larva first constructs a serpentine mine which is gradually enlarged into an irregular blotch. All mesophyll tissue is consumed thereby creating a full depth mine.

At the conclusion of the mining stage, the larva constructs a flattened case by first cutting an oval patch out of both the upper and lower epidermal layers of the mine and then sewing them together around the edges with silk. The initial case measures approximately 5 mm long and 3 mm wide, and frequently has a slight constriction at the middle. The larva lives in this case for the remainder of its larval existence, dragging it about over the leaf and occasionally to other leaves as it feeds. After locating a suitable feeding spot, the larva usually anchors the case to the leaf with silk before commencing to feed. From this stage on the feeding injury caused by the larva is that of a skeletonizer and is primarily, but not entirely, restricted to the lower leaf surface. The entire leaf area covered by the larval case is normally skeletonized although sometimes the central portion covered by the case is left intact, thus leaving a partially or completely ringed-out portion on the leaf so characteristic of *Paraclemensia acerifoliella*.

As the larva matures, more oval sections are cut from the leaf and added to the top of the old case in the manner of a shelter, with the larva alternately inverting the entire case each time to accommodate the latest addition. Eventually the larva secures the shelter firmly for the last time to the underside of a leaf, branch of some other suitable site and pupates. Brown and Eads report that the leaves of the coast live oak (*Quercus agrifolia*) normally fall in the spring, and that pupation may occur either before or after leaf fall. The length of the pupal

period appears to be relatively short, perhaps no longer than two weeks. Emergence of the adult has never been observed in nature, although more than likely it begins in early to mid June and continues into late July.

REFERENCES

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CRANEIOBIA LAWSONIANAE DE MEIJERE, NEW SYNONYM OF JANETIELLA SISKIYOU FELT

(DIPTERA: CECIDOMYIIDAE)

Chamaecyparis lawsoniana (A. Muir.) Parl. (Cupressaceae), the Port-Orford-Cedar, is a native of southwestern Oregon and northwestern California. It grows well elsewhere, however, and was introduced into Europe, where many ornamental varieties of this tree have been cultivated. Seeds of those varieties occasionally are sent to the U.S. but require treatment at the port of entry because of the presence of cecidomyiid larvae. In the past I have identified those larvae found in the seeds as *Craneiobia lawsonianae* de Meijere (1935, Tijdschr. Ent. 78:129), a species originally described from adults reared from *C. lawsoniana* seeds in the Netherlands. K. M. Harris, of the Royal Horticultural Laboratories, Wisley, England, pointed out to me the probability that de Meijere's species was the same as *Janetiella siskiyou* Felt (1917, J. New York Ent. Soc. 25:194), which was described from a female and larva taken from seeds of *C. lawsoniana* in Oregon. Upon checking, I find that Felt's type series, and a male collected subsequently from Oregon, are identical to larvae and adults taken repeatedly in Quarantine at Hoboken, N.J., in shipments of seed from Italy. Both series fit de Meijere's original description and figures of *C. lawsonianae*, and the latter is therefore a new junior synonym of *J. siskiyou*. This species was apparently introduced into Europe from America with the plant seeds.—RAYMOND J. GAGNÉ, *Systematic Entomology Laboratory, Agricultural Research Service, U.S. Department of Agriculture, c/o U.S. National Museum, Washington, D.C. 20560.*